BOTTLE CRATE

TECHNICAL FIELD

This invention relates to a bottle crate.

BACKGROUND ART

Generally, beverage bottles go through a bottle facility and are loaded into trays which are then palletized. A pallet may include multiple layers of trays of a single product, such as soft drinks or beer of the same brand. Trays in successive layers are stacked or cross-stacked on top of each other, with the bottles bearing most of the load of the above-stacked trays. These bulk pallets are then typically stored in a warehouse for shipping to retailers.

One recent advance in the distribution area is a use of a product handling device known as the Tygard Claw® manufactured by Tygard Machine and Manufacturing Company of Pittsburgh, Pennsylvania. The Tygard Claw can be installed to the front or the side of a conventional fork lift carriage, and enables a distributor to pick from a bulk pallet of product one layer at a time. Briefly, the Tygard Claw is a large clamping device with four individual walls that approach a layer of product on a pallet squarely and uniformly by each wall moving toward and away from a pallet layer in a translating motion. The actuators for the walls are equipped so that the walls are touch sensitive in order to lift the product without damage. These clamping devices such as the Tygard Claw enables distributors to assemble shipments of product without the need to manually pick and move layers of product.

In many cases depending on the particular crate and its contents, the crate may be deformed to point where the beverage containers loaded in the crate contact each other. Crates under these conditions may eventually fail due to the repeated stress, deflection, and deformation.

Consequently, there is a need for an improved bottle crate which is able to withstand the automated handling devices described above. The improved crate should be able to withstand the repeated stress to which it is subjected by such automated handling devices. The improved crate should also have relatively less deflection and deformation and improved durability than present crates in order to enhance and lengthen the life of the crate.

DISCLOSURE OF INVENTION

It is an object according to the present invention to provide an improved crate for bottles which is able to work efficiently with automated handling devices.

It is another object according to the present invention to provide an improved crate for bottles which is more durable and subject to less deflection and deformation.

It is another object according to the present invention to provide an improved crate for bottles having corner areas which are adapted to better withstand the stresses placed on such crates.

It is still another object according to the present invention to provide an improved bottle crate which is stackable and nestable with similar crates.

In accordance with these objects and goals, provided is a nestable crate for bottles which includes a floor member and first and second pairs of opposed sidewalls integrally formed with the floor member. Each sidewall includes a side band member which is defined by a centrally disposed upper edge and lower edge. The lower edge is spaced above the floor member by a predetermined distance to define a sidewall nesting area therebelow. The upper and lower edges are each contoured downwardly -- which in one embodiment is preferably in the plane of its respective sidewall -- to form a corner band portion having a corner upper edge and

corner lower edge, wherein each nesting area matingly receives a corresponding side band member of a crate nested subjacent thereto.

In one embodiment, the sidewall includes a plurality of projection members which extend upwardly above the upper edges of each band member and received within corresponding openings formed in the lower edge when nested below a similar crate. The crate according to the present invention may also include a corner projection member which extends upwardly from the upper surface of the corner wall portion and received within a corresponding corner opening formed in the corner lower edge when nested below a similar crate. The upper surface of the sidewall and corner wall projections are substantially co-planar.

In one embodiment, one of the first and second pairs of opposed sidewalls includes an opening for providing visibility into the crate and the other pair of sidewalls includes a handle member for handling the crate. The sidewalls have a double-wall construction. Preferably, the sidewalls have an outer portion defined by the band member, and an inner surface which is integrally attached to the floor member.

In keeping with the present invention, also provided is a nestable crate for bottles which includes a base and a sidewall structure which extends upwardly from the base and is attached thereto. The sidewall structure includes a continuous band member which has a pair of opposed side band portions, a pair of opposed end band portions, and corner band portions disposed between each adjacent side band portion and end band portion. The band member includes a contoured upper edge and lower edge, wherein the lower edge at the side band portions and end band portions is spaced above the base a predetermined distance to define a corresponding nesting area therebelow which receives the corresponding side band portion and end band portion when nested with a similar crate. The upper edge at the side band portions and end band portions are directed downwardly such that the upper edge at the corner band portion is disposed below the plane of the upper edge at the side band portions and end band portions to define a corner pocket disposed above the corner portion upper edge.

The above objects and other objects, features, and advantages of the present invention are readily apparent from the following detailed description of the best modes for carrying out the invention when taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

FIGURE 1 is a perspective view of a first embodiment of the bottle crate according to the present invention.

FIGURE 2 is a bottom perspective view of the bottle crate of Figure 1, wherein the pattern of the floor member is only partially shown, and is more particularly shown in Figure 4;

FIGURE 3 is a top plan view of the bottle crate;

FIGURE 4 is a bottom plan view of the bottle crate;

FIGURE 5 is a front elevational view of the bottle crate, the rear elevational view being a mirror image thereof;

FIGURE 6 is a left hand elevational view of the bottle crate, the right hand view being a mirror image thereof;

FIGURE 7 is cross-sectional view along line 7 - 7 of Figure 3, the longitudinal centerline;

FIGURE 8 is a cross-sectional view along line 8 - 8 of Figure 3, the transverse centerline;

FIGURE 9 is a partial cross-sectional perspective view showing two similar crates according to the present invention in a nested orientation;

FIGURE 10 is an alternate partial cross-sectional perspective view of the nested crates of Figure 9, with focus on the interior of the crates;

FIGURE 11 is a cross-sectional side elevational view of the nested crates of Figure 9 and 10, taken from the view of arrow line 11 in Figure 10;

FIGURE 12 is a partial side elevational view of the nested containers of Figures 9 - 11, illustrating the exterior of the nested containers taken from the view of arrow line 12 in Figure 9;

FIGURE 13 is an alternate perspective view of the nested containers of Figures 9 - 12, with focus on the exterior of the corner portions of the nested crates;

FIGURE 14 is a perspective view of a second embodiment of the bottle crate according to the present invention;

FIGURE 15a is a full perspective view of a third embodiment of the bottle crate according to the present invention;

FIGURE 15 is a partial perspective view of the third embodiment of the bottle crate shown in Figure 15a;

FIGURE 16 is a top plan view of the crate of Figure 15a;

FIGURE 17 is a bottom plan view of the crate of Figure 15a;

FIGURE 18 is a front side elevational view of the crate of Figure 15a, the rear side elevational view being substantially identical thereto;

FIGURE 19 is a left side elevational view of the crate of Figure 15a, the right side elevational view being substantially identical thereto;

FIGURE 20 is a partial end elevational, cross-sectional view (similar to Figure 8 of the first embodiment) taken along the transverse centerline of the second embodiment of the crate of Figure 15a; and

FIGURE 21 is a perspective view of a third embodiment of a bottle crate according to the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

With references to Figures 1 - 8 of the drawings, illustrated is a first embodiment of a bottle crate 10 according to the present invention. Crate 10 may also be referred to as a tray, container or case, and is formed of a plastic material and preferably a thermoplastic material. Crate 10 includes a floor member or base 12, a first pair of opposed sidewalls 14,16 and a second pair of opposed sidewalls 18,20. For ease of reference, the second pair of opposed sidewalls 18,20 is referred to herein as a pair of end walls 18,20. Sidewalls 14,16, end walls 18,20 and floor member 12 are integrally formed with each other in order to define a compartment therein. As best illustrated in Figures 1 and 3, floor member 12 is inwardly offset from the planes of each sidewall 14,16 and end wall 18,20.

Sidewalls 14,16 include a band member 22,24 defined by an upper edge 26,28 and a lower edge 30,32. In a preferred embodiment, sidewalls 14,16 include one or more openings or windows 34 corresponding to each bottle disposed along the inner surface 36 of sidewalls 14,16. Openings 34 provide a view into the crate and are preferably at label height so that the label of the bottles contained within crate 10 are visible. Lower edges 30,32 are raised and offset from the plane of floor member 12 at a central region of band members 22, 24 and are contoured downwardly toward each corner portion 38. In the embodiment shown in Figures 1-13, the contour of the band upper and lower edges appears undulating.

As illustrated in Figures 1 and 5 - 8, sidewalls 14,16 also include a plurality of raised projections 40 extending above the plane of upper sidewall edges

26,28 for assisting with nesting of similar crates 10, as illustrated and disclosed in Figures 9 - 13 herein, and the associated text.

As shown in Figures 1-3, sidewalls 14,16 and end walls 18,20 are illustrated as having a double wall thickness. As illustrated in Figures 2, 4, 10, 11, lower edges 30,32 of sidewalls 14,16 include recesses 42 between the double structure for receiving the projections 40 of a similar crate nested there below, thereby helping to secure the crates when in a nesting orientation. These openings 42, openings 44 on upper edge 24,28,50,52 and windows 34 also assist in reducing material and thus providing a lower weight crate.

End walls 18,20 also include an end wall band member 46,48, each having an upper edge 50,52 and a lower edge 54,56. End walls 18,20 have formed therein a handle member 58,60 which provides a means to handle the container in association with handle openings 59,61, which also provide a similar function to window openings 34 in that the handle openings 59,61 allow the crate contents and bottle labels proximate thereto to be visible. As with the sidewalls 14,16, the end wall band members 46,48 -- and more particularly upper edges 50,52 and lower edges 54,56 -- are raised in a central portion and are contoured downward in the end wall plane toward corner portions 38 to define corner band 64. Lower edges 54,56 are raised upward from floor member 12. End walls 18,20 also include upwardly raised projections 62, similar to sidewall projections 40, which serve to assist with nesting. Projections 40, 62, generally also help to distribute load across the crate.

Attention is directed to corner portions 38. As illustrated, corner portions 38 include a lower corner band 64 defined by the contoured outboard edges of the sidewall band members 22,24 and end walls band members 46,48 adjacent to each corner portion 38. Corner portions 38 also include an upstanding corner projection portion 66 which extends above the upper surface 63 of corner band member 64 and as illustrated in Figures 1 and 5-6, is slightly offset inwardly from outer surface 68 of band member 64. The upper surface of corner projection 66 is substantially co-planer with the upper surface of sidewall projections 40 and end wall projections 62. Note that like projections 40 and 62, when nested, corner projections

66 are received within corner openings 80 shown in Figures 2 and 4. In addition to nesting, projection members 40, 62, and 66 also serve to transfer load from one crate 10 to another.

Each corner projection 66 has on either side an opening or pocket 70,72 disposed between projection 66 and the adjacent sidewall band members 22,24 and end wall band members 46,48, such that while the band portions 22,24, 46,48 and 64 are continuous around a periphery of the crate, corner projections 66 are not directly attached to the adjacent sidewalls 14,16 and end walls 18,20. Accordingly, when crate 10 is used in connection with an automated handling device such as the Tygard Claw, the corner structure allows crate 10 to flex inward and does not subject the corner portions 38 to significant stresses as with previous designs. By having a free standing corner projection 66 which is not connected to the upper part of the adjoining sidewalls and end walls, sidewalls 14,16 and end walls 18,20 deflect towards the interior of the crate without putting undue stress on the corner.

With reference to the first embodiment shown in Figures 1-13 and more particularly to Figures 1 and 5 - 6, sidewall band members 22,24 and end wall band members 46,48 may also be characterized as having an upper band portion 82,84 and a lower band portion 86,88, which are separated by window openings 34, and are connected to each other by band columns 90.

Floor member 12 has an upper surface which includes a plurality of bottle support areas 74. In the embodiment shown, there are twenty-four bottle acceptance areas. As illustrated in Figures 2 and 4, the bottom surface of floor member 12 has a plurality of recessed areas 85, defined by downwardly extending rib members 87. The recessed areas 85 correspond to bottle support areas 74 such that when a crate 10 is stacked upon a similar crate 10 positioned therein, the cap or top of each bottle portion is disposed within the recessed area to control the movement and stability of the crates when stacked. Note that floor member 12 includes an open lattice pattern in order to reduce the weight of crate 10.

Inner surfaces 36 of the sidewalls 14,16 and end walls 18,20 preferably have alternating portions 37 having a curvature in order to mate with the contour of the bottle disposed therein, but of course may also be planar without departing from the teachings according to the present invention. Between curved portions 37, the sidewalls and end walls include an inner surface portion 47. Inner surface portions 47 each include an elongated inwardly projected tab member 76 which projects inwardly into the compartment of crate 10 to provide strength to sidewalls 14,16 and end walls 18,20. Further, the opening 78 below the sidewall lower edges 30,32 and the end wall lower edges 54,56 and between members 76, allow the typically bulbous shaped bottom portion of a bottle to project slightly through opening 78 thereby allowing the inner compartment to more efficiently hold bottles therein. Also, in such a nesting orientation, the inwardly projecting portions 76 mate with and are received in corresponding outer recesses of lower wall portions 95.

Figures 9 - 13 illustrate crate 10 being nested with a similar crate 10' oriented therebelow. Those features of crate 10', corresponding to features in crate 10 shall have similar reference numerals with the addition of a prime (') designation.

Figures 10 and 11 illustrate the nest of crates 10 and 10' having a cross-section taken through sidewalls 14,16 and more particularly through a sidewall projection 40 of sidewall 16. It is illustrated therein that during nesting, sidewall projection 40' is received within lower edge openings 42, thereby allowing crates 10 and 10' to securely nest with each other. Again, the nesting feature provides for efficient storage and transport of crates 10 when not is use.

With reference to Figures 12 and 13, illustrated therein are exterior side and perspective views of nested crates 10 and 10'. Particularly, it is noted for sidewalls 14',16' that band members 22',24' mate with and are received within a correspondingly shaped side wall lower opening 92, below lower edges 30,32 (see also Figure 9), while end walls band members 46',48' are received in lower end wall opening 94, beneath lower end wall edge 54,56. It is also noted from Figures 9, 12, and 13 that corner projection 66', like projections 40' and 62', are received within

corner bottom opening 80 during the nesting orientation. Accordingly, the handles 58',60' and the sidewall upper band 82',84' provide for a stable and efficient nesting of crates 10.

Figure 14 illustrates a second embodiment of the bottle crate, designated as bottle crate 110, according to the present invention. The features of crate 110 corresponding to those of the first embodiment shall have like reference numerals with the addition of a "1" prefix. Bottle crate 110 is generally similar to bottle crate 10, however, bottle crate 110 has a solid upper edge 126,128. While sidewalls 114,116 and end walls 118,120 generally have a double wall thickness, directly below sidewall upper edges 126,128, the outer surface 141 is open such that the upper inner surface 143 forming the upper curved bottle support area has a single wall thickness.

With reference to Figures 15a through 19, illustrated therein is a third embodiment of a bottle crate 210 according to the present invention. The features of crate 210 corresponding to those of the first embodiment shall have like reference numerals with the addition of a "2" prefix. Accordingly, crate 210 includes a floor member 212, opposed sidewalls 214, 216, and opposed end walls 218, 220.

Sidewalls 214, 216 include a sidewall band member 222, 224, respectively, having an upper edge 226, 228 and a lower edge 230, 232. Crate 210 has a continuous band member, including corner portion 238. Instead of corner projections 66, crate 212 includes a corner opening 272 between adjacent sidewalls and end walls, displaced above corner portion 238, thus allowing crates 210 to flex when handled by automated handling equipment, as previously discussed.

The pair of opposed end walls 246, 248 has an upper edge 250, 252 and a lower edge 254, 256. Crate 210 also includes a handle portion 258, 260 integrally formed within end walls 246, 248.

Inner surface 236 of crate 10 includes curved areas 237 which mate with the bottles stored therein. Alternating between adjacent curved areas 237 are

a plurality of surfaces 247 having each having an inwardly projecting member 276 for separating bottles adjacent the crate wall. It is contemplated that surfaces 247 in crate 210 are relatively wider than surfaces 47 of crate 10, because the corresponding contact area is less wide for accommodating smaller bottles, if desired. Members 276 have a rounded semi-frustoconical surface profiles. The lower portion 239 of inner surface 247 also projects inwardly such that there is a transitional portion 241 disposed between upper portion 243 and bottom portion 239. This inwardly directed lower portion assists in defining a pocket to receive the lower bulbous portion of the bottles which project through opening 278.

As illustrated in Figures 14 and 18-19, the band members 222, 224 and 246, 248 (and particularly the upper and lower edges thereof) are contoured downwardly toward corner portions 238. The contours in this embodiment may have different shapes, as those in crate 210 are less wave-like than in crate 10. Like the first embodiment of crate 10, the band members define nesting areas 292,294 therebelow, into which the sidewall and end wall band members of crates nested subjacent thereto are matingly received.

Further, corner portion 238 of crate 210 includes an inner surface 267 having an outwardly offset upper portion 269, an inwardly directed lower portion 271 and a transition portion 273 therebetween. As illustrated in Figures 15a and 15b, the lower edge 277 of corner band 264 does not extend downward to be planar with floor member 212, such that lower corner portion 271 is visible from the crate's exterior. Thus, in a nesting orientation, lower edge 277 of corner band member 264 rests on upper surface 275 of corner band member 264. Also, in such a nesting orientation, the inwardly projecting portion 276 mate with and are received in corresponding outer recesses of lower wall portions 295.

Further, crate 10 includes a pair of projections 297 for hindering misuse of crate 210. Specifically, projections 297 are oriented diagonally and are disposed on opposed end walls, projecting above the band upper edges. Thus, when crate 210 is positioned upside-down on a flat surface, such that the lower surface of the floor member 212 is oriented up, projection 297 prevents crate 210 from resting

in a stable manner, and thereby causes crate 210 to rock back and forth during such unintended use. When like crates are nested, projections 297 are also received within the lower edge openings of the end wall band members. Figure 20 illustrates a partial end elevational, cross-sectional view (similar to Figure 8 of the first embodiment) taken along the transverse centerline of the second embodiment of the crate of Figure 15a.

With reference to Figure 21, shown is a perspective view of a third embodiment of bottle crate 310 according to the present invention. The features of crate 310 corresponding to those of the first embodiment shall have like reference numerals with the addition of a "3" prefix. As illustrated therein, corner portions 338 are offset inwardly and recessed from the planes defined by the side wall band members 322,234 and the end wall band members 346,348. This design thereby reduces stress in corner areas 338, such that load transfer would be almost completely in the band members. The stresses to which the crate is subjected to by the aforementioned automated handling equipment would also be placed upon the band members.

While embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention.